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(54) **Continuous polymerization process and products therefrom**

(57) A continuous process for oligomers which do not contain, as polymerized units, carboxylic acid-containing monomers and their salts, including the steps of:

(1) forming a reaction mixture, substantially free of carboxylic acid-containing monomers and their salts, containing:

- (i) 0.5 to 99.95% by weight of the reaction mixture of at least one ethylenically unsaturated monomer; and
- (ii) 0.05 to 25% by weight, based on the weight of the ethylenically unsaturated monomer, of at

least one free-radical initiator; and

(2) continuously passing the reaction mixture through a heated zone wherein the reaction mixture is maintained at a temperature of at least 150°C and a pressure of at least 30 bars for from 0.1 seconds to 4 minutes to form terminally-unsaturated oligomers.

In addition, processes for forming oligomers of vinyl acetate and oligomers of vinyl alcohol are disclosed. Mixtures of fully saturated and terminally unsaturated oligomers are also disclosed.



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number

EP 99 30 9772

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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X	US 5 576 386 A (KEMPTER FRITZ E ET AL) 19 November 1996 (1996-11-19) * claims 1,5,6,11-18 * * column 3, line 17 * * column 4, line 14 * ---	1-19	
X	EP 0 590 842 A (ROHM & HAAS) 6 April 1994 (1994-04-06) * claims 1-10 * * page 4, line 26 * * page 5, line 1,2 * ---	1,2,4-8, 10-16	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
X	EP 0 552 876 A (ROHM & HAAS) 28 July 1993 (1993-07-28) * claims 1-18 * * page 7, line 19,20 * ---	1,2,4-8, 10-16	C08F
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-The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>14 March 2000</b>	Examiner <b>Rose, E</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &amp;: member of the same patent family, corresponding document</p>			

EPO FORM 1503 (3.02) (P04C01)



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### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-19 (in part)



European Patent  
Office

LACK OF UNITY OF INVENTION  
SHEET B

Application Number  
EP 99 30 9772

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: Claims 1-19 (in part)

Process for forming terminally unsaturated oligomers (A).

2. Claims: Claims 20-21 (in part)

Mixture comprising: (A) oligomer having terminal unsaturation and (B) oligomer having no terminal unsaturation.

3. Claim : Claim 22 (in part)

Composition consisting of a) (A) or (B), b) surfactant, c) water.

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 30 9772

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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14-03-2000

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